

**ADMINISTRATIVE REPORT
PUBLIC HEALTH SERVICE/CDC/NIOSH/DSR
FACE 98-03**

DATE: January 20, 1998

TO: Director, National Institute for Occupational Safety and Health

FROM: Division of Safety Research, NIOSH

SUBJECT: Two Fire Fighters Die of Smoke and Soot Inhalation in Residential Fire - Pennsylvania

SUMMARY

On October 27, 1997, two male fire fighters died of smoke and soot inhalation while fighting a residential fire. An Engine Company comprised of four fighters was responding to a 911 call of a downed power line in a residential neighborhood when one of the fire fighters noticed smoke emitting from the basement area of a nearby residence. Without notifying fire dispatch of the change in conditions (smoke coming from the residence), three fire fighters entered the residence to assist the residents out, and to survey the conditions and location of the fire. The fire fighters then exited the residence to don their self-contained breathing apparatus. Two of the fire fighters reentered the residence with a charged 3/4-inch booster line and proceeded to the basement (location of the fire) to attack the fire. This was the last time either fire fighter was seen alive. NIOSH investigators concluded that, to prevent similar occurrences, fire departments should:

- *ensure that fire fighters advise dispatch of any change in conditions that would warrant a change in the status of unit(s) responding to a specific condition*
- *ensure that fire fighters wear and use PASS devices when involved in fire fighting, rescue, and other hazardous duties.*

INTRODUCTION

On October 27, 1997, two male fire fighters, victims #1 and #2, ages 43- and 27-years respectively entered the right side of a twin dwelling (the left side was not occupied) that had smoke emitting from the basement window. The two fire fighters entered the dwelling through the front door went in to the living room, then the breakfast room, and down the stairs to the basement. Approximately 30 minutes later, both fire fighters were found in the breakfast room, unresponsive. On October 29, 1997, the International Association of Fire Fighters (IAFF) requested that NIOSH provide technical assistance in reviewing the circumstances surrounding these fatalities. On November 24, 1997, the Chief, Trauma Investigations Section and a Safety Specialist conducted an investigation of this incident. Meetings were conducted with the Fire Commissioner and his staff, fire fighters responding to the incident, and the IAFF union representative and attorney for the union. Copies of photographs of the incident site were obtained from the fire department along with an estimated timeline of the incident, and a site

visit was conducted.

The fire department involved in the incident serves a population of 1.4 million in a geographic area of 129 square miles. The fire department is comprised of 2,515 employees, of whom 2,387 are fire fighters. The fire department provides all new fire fighters with a 71-day training program at their fire academy which is designed to cover all areas of fire department operations, including tools and equipment, ladder operations, engine company operations, chemistry of fire, flashover, backdraft, use of respirators, hoseline operations, search and rescue, emergency medical training, and facility maintenance. The fire department's written standard operating procedures manual was reviewed and appeared to be complete. The victims had 21 years fire fighting experience and 6 months experience, respectively.

INVESTIGATION

On October 10, 1997, Engine Company 63 (a Lieutenant and 3 fire fighters) was dispatched at 0028 hours in response to a 911 call regarding a downed power line in a residential neighborhood. They arrived on the scene at 0032 hours and proceeded to rope off the area of the downed power line with barrier tape, and called the power company to report the downed line. One of the fire fighters was using a booster line (3/4-inch) to put out small fires started by the arcing power line. At approximately 0056 hours, the driver of Engine 63 noticed haze smoke emitting from the basement window of the residence that was affected by the downed power line. It was later determined that the broken neutral conductor from the power line had caused an electrical outlet in the dining room of the residence to short circuit. Burning embers from the short circuit fell through the floor into the basement via an opening for electrical conduit, igniting combustible materials in the basement. The owner of the residence was outside when the Lieutenant and two fire fighters went to investigate. The owner's son was upstairs and was led out of the house by one of the fire fighters. The Lieutenant (victim #1) and one fire fighter (victim #2), using flashlights, proceeded through the light haze visible in the living room into the dining room and breakfast room, and down the stairs to the basement to evaluate the situation (figure), then retreated from the basement to the outside to don their self-contained breathing apparatus (SCBA).

At approximately 0107 hours victims #1 and #2 reentered the residence wearing SCBAs. They pulled in a 3/4-inch booster line and proceeded to the basement to attack the fire. At approximately 0117 hours, fire fighter #3, who was feeding line to #1 and #2, returned to the Engine to pull a 1 3/4-inch line, and to assist the driver in pulling a 3-inch line approximately 300 feet to a hydrant. The driver asked him what was going on in the residence. Fire fighter #3 stated he did not know. Fire fighter #3 then went back into the residence with a charged 1 3/4-inch line and advanced it as far as the dining room before encountering moderate smoke and poor visibility.

At 0122 hours, the driver of Engine 63, who remained on the outside to provide a hydrant hook-up and operate the pump, requested a Tactical Box, which consists of one additional pumper (Lieutenant and 3 fire fighters), 2 Ladder Trucks (each with one Lieutenant and 4 fire fighters), and one Battalion Chief and aide. This was the first time fire dispatch was alerted as to a possible fire at the residence near the downed power line.

At 0125 hours the Battalion Chief arrived on the scene and attempted to call Engine 63 on the portable radio, but received no response. At approximately the same time, Engine 51, Ladder 29, and Ladder 8 arrived on the scene. Two fire fighters from Ladder 29 remained on the exterior of the house to perform ventilation while the Lieutenant and two fire fighters from Ladder 29 went into the residence to perform a routine primary search. The first fire fighter to enter followed the 1-3/4 inch line where he located fire fighter #3 from Engine 63. The Lieutenant from Ladder 29 also reached fire fighter #3 and asked him, "Where is your Company?" Fire fighter #3 stated that he could not find his company, but he thought they were in the basement. The Lieutenant stated that at this time visibility was very poor. One of the fire fighters from Ladder 29 proceeded upstairs to break out windows to help vent the residence. The Lieutenant and a fire fighter from Ladder 29, and fire fighter #3 from Engine 63, exited the residence. The fire fighter from Ladder 29, who was upstairs venting the residence, returned to the downstairs dining room where he found the nozzle of the 1 3/4-inch charged line and saw the booster line going down the steps to the basement. He then decided to return to the second floor, following the 1 3/4-inch line, and ran into the Battalion Chief in the living room. The Battalion Chief then radioed on the fireground band to look for the missing fire fighters from Engine 63.

At 0142 hours a Full Box was requested, which consists of two more Engines plus another Battalion Chief. Also, at this time Ladder 29 fire fighters were entering the residence from the front, and Engine 51 fire fighters were entering the basement from the rear of the residence.

During this time, two fire fighters from Ladder 29 entered the front door and proceeded into the breakfast room where they found both fire fighters from Engine 63 in a kneeling/crouched position, mask off, and unresponsive. Both downed fire fighters, still unresponsive, were removed from the residence. They were transported by EMS to a local hospital where advanced life support failed to revive either fire fighter.

Since both fire fighters were found with their masks off, it can be inferred that they had run out of air and no one heard the low-air alarms. Neither fire fighter had turned on their personal alert safety systems (PASS) devices.

Note: Both SCBA's worn by the victims were sent to the NIOSH Certification and Quality Assurance Branch for testing. A copy of the NIOSH evaluation of the SCBA's is included as an Appendix to this report.

CAUSE OF DEATH: According to the medical examiner, the cause of death was due to smoke and soot inhalation. Carboxyhemoglobin levels were 38% and 63%, respectively.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Fire departments should ensure that fire fighters advise dispatch on any change of conditions that would warrant a change in the status of unit(s) responding to a specific condition.

Discussion: One engine was dispatched on a notice of a downed power line. However, during this routine nonfire response, conditions at the scene of the downed power line changed when one of the fire fighters noticed smoke coming from the basement window of the residence affected by the downed line. An investigation into the smoke coming from the residence was

initiated without notifying dispatch of a change in conditions. Had dispatch been alerted to smoke from the residence, additional support would have immediately been dispatched to the incident scene.

Recommendation # 2: Fire departments should strictly enforce the wearing and use of PASS devices when fire fighters are involved in fire fighting, rescue, and other hazardous duties.

Discussion: The PASS device is a small electrical device worn by the fire fighter which will emit a distinctive audible alarm if the fire fighter becomes motionless for more than 30 seconds. Both fire fighter victims were wearing PASS devices; however, neither device had been activated.

REFERENCE

National Fire Protection Association. NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, National Fire Protection Association, Quincy, MA.

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Fire Fighter Fatality Project - Using the Fatality
Assessment and Control Evaluation (FACE) Project

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatality Assessment and Control Evaluation (FACE) investigations when a line-of-duty Fire Fighter Fatality is reported. The goal of these evaluations is to prevent fatal work injuries in the future by studying the working environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

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